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Microscopic suspension feeders near boundaries: Effects of external water flow RACHEL PEPPER, University of Puget Sound, M.A.R. KOEHL, University of California Berkeley — Microscopic sessile suspension feeders are an important part of aquatic ecosystems and form a vital link in the transfer of carbon in aquatic food webs. These suspension feeders live attached to boundaries, consume bacteria and small detritus, and are in turn eaten by larger organisms. Many create a feeding current that draws fluid towards them, and from which they filter their food. In still water, the feeding current consists of recirculating eddies which form as a result of fluid forcing near a boundary. These recirculating eddies can be depleted of food and significantly decrease nutrient uptake; a variety of strategies have been proposed for how attached feeders increase their access to undepleted water. We investigate the interaction of the flow produced by a microscopic suspension feeder with external environmental flow, such as the current in a stream or ocean. We show through calculations that even very slow flow (on the order of microns per second) is sufficient to provide a constant supply of undepleted water to suspension feeders when the feeders are modeled with perfect nutrient capture efficiency and in the absence of diffusion. We also discuss which natural flow environments exceed the threshold to supply undepleted water and which do not, and we examine how characteristics of the suspension feeders themselves, such as stalk length and feeding disk size, influence feeding currents and their interactions with external flows.

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